

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0060] with the following:

[0060] The issues with oxygen exposure relate to the temperature/oxygen partial pressure conditions where PdO forms, and the substantial lattice expansion associated with oxide formation. Oxidation followed by reduction is known to leave residual voids in the Pd. Metallic Pd begins to oxidize to PdO in air at approximately 200° C., with oxidation becoming essentially complete between 400 and 500 °C (S. S. Cole, Jr. "Oxidation and reduction of palladium in the presence of silver", J. Am. Ceram. Soc. 68 (4), C106-C107 (1985)). PdO then decomposes back to metallic Pd in air at approximately 850-900° C. (S. S. Cole, Jr. "Oxidation and reduction of palladium in the presence of silver", J. Am. Ceram. Soc. 68 (4), C106-C107 (1985); S. F. Wang and W. Huebner, "Thermodynamic modeling of equilibrium subsolidus phase relation in the Ag--Pd--O₂ system", J. Amer. Ceram. Soc. 74(6), 1349-1353 (1991)). These temperatures are lowered roughly 20-30° C. for 30% Ag in Pd. The "window" for PdO formation and decomposition is also a function of the O₂ partial pressure (P_{O₂}). Less detailed information is available for atmospheres other than air; however, the temperature of PdO decomposition (more accurately, Pd--PdO equilibrium temperature) has been measured at a function of P_{O₂}. For air, this equilibrium temperature is approximately 800° C.; for P_{O₂}=10⁻² atm (as found in a normal N₂ cylinder) it is about 690° C.; and for P_{O₂}=10⁻⁵ atm (typical UHP N₂, it is about 500° C.) (S. F. Wang and W. Huebner, "Thermodynamic modeling of equilibrium subsolidus phase relation in the Ag--Pd--O₂ system", J. Amer. Ceram. Soc. 74(6), 1349-1353 (1991)). In hydrogen separation membrane ~~6processing~~ processing, it is preferable to minimize Pd exposure to even low P_{O₂} within the temperature window of oxide formation, although brief oxidation has been reported to activate Pd membranes for H₂ permeation, presumably by removal of surface contaminants.

Please replace paragraph [0066] with the following:

[0066] The coarse (unpolished) stainless supports and ion beam treated Mott supports underwent significant and proportionately similar drops in permeance with oxidation, indicative of sintering of the porous stainless steel. In contrast, the stainless woven mesh supports have initial permeance only slightly higher than the coarse Mott supports, but experienced very small permeance reduction with oxidation, indicating that the mesh structure is more stable to sintering. It is also contemplated that a composite ceramic-modified support, such as those provided by Trumem International would also be useful. Such supports provide a ceramic substrate layer, of about 1 to 2 mm thick over the coarse metallic support, and provide a layer of submicron particles, and provide a much smaller pore size and more uniform surface than the underlying coarse support. In such supports, the ceramic substrate layer itself would function as the diffusion barrier, thus oxidation will not be required. Localized ion and/or laser beam sintering is utilized to treat the membrane disposed ~~thereon~~ thereon.

Please replace paragraph [0067] with the following:

[0067] The permeances for “support” (S) and “support+membrane” (S+M) can be ~~evaluated~~ calculated directly from experimental data, and permeance for the membrane layer itself can then be calculated from the relationship:

$$\frac{1}{L_{S+M}} = \frac{1}{L_S} + \frac{1}{L_M}, \quad (1)$$